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Intermountain Power Project
Intermountain Generating Station
Fugitive Dust Emissions System
Analysis

B&V Project 9255
B&V File 42.1206
July 13, 1982

Mr. James H. Anthony, Project Manager
Intermountain Power Project
Department of Water and Power
Room 931, General Office Building
P. O. Box 111, T. A.
Los Angeles, California 90051

Attention: Mr. Jack Hayashi, Project Engineer

Gentlemen:

As requested in your letter of May 26, 1982, a listing is enclosed of the Department and Black & Veatch suggested changes to be incorporated in the Fugitive Dust Emissions System Analysis. Table 1 lists dust sources and 24-hour emission rate data and Table 2 lists 24-hour emission factor data and input parameters.

Responses to each of the 13 comments in the May 26 letter follow. The only area where further clarification is required from the Department concerns the recently revised characteristics of the candidate and the weighted average coals.

*Comment 1: The Department requests that particulate matter (PM) emissions from the IGS chimneys be included in the analysis.*

Response: The analysis will be revised using the information contained in the June 1981 H. E. Cramer document entitled, Calculated Air Quality Impact of Emissions from the IPP Power Plant for the Revised Stack Configuration.

*Comment 2: The Department requests both the Prevention of Significant Deterioration (PSD) increment standards and the National Ambient Air Quality Standards (NAAQS) be addressed in the analysis. The PSD increment standards are the controlling standards for the IGS, but an explanation of compliance with the NAAQS will make the B&V "Fugitive Dust Emissions System Analysis" more complete.*

<u>Response</u>: Both the PSD increments and National Ambient Air Quality Standards (NAAQS) will be addressed in the revised analysis.

*<u>Comment 3</u>: The Department recommends that B&V review the September 23, 1981 report "Workbook on Estimation of Emissions and Dispersion Modeling for Fugitive Particulate Sources" prepared by Environmental Research and Technology, Inc., for more appropriate, EPA-approved, emission factors (EF).*

<u>Response</u>: Fugitive dust impact analyses can be quite subjective. The following is quoted from the above EPA reference.

> "The fugitive emission empirical formulas currently available are not recommended for estimation of short-term (24-hour) emissions. Weighing factors and adjustments of the long-term formulas have not been developed to convert the emission estimates to short-term periods. Until this limitation in current technology is rectified, however, we recognize that short-term analyses may be required. Therefore, we concur that a reasonable approach would be case by case evaluations using the long-term empirical formulas cited above to estimate short-term emissions (for modeling)."

This EPA workbook was reviewed for more appropriate emission factors to be used in the revised analysis. Table 2 attached provides information used in deriving the proposed emission factors for revised 24-hour impact analysis. These proposed emission factors were developed using conservative assumptions and the equations normally used for annual emission estimates. Similar equations will be used for predicting the annual impact.

*<u>Comment 4</u>: The Department requests that nontemporary PM emissions from haul roads be addressed in the analysis.*

<u>Response</u>: The haul roads used to transport the solid waste, coal, and limestone will be modeled in the revised analysis. Refer to Table 1 for the proposed emission factor and control efficiency data. Particle settling velocities will be included in the modeling to simulate particle deposition.

*<u>Comment 5</u>: The EF used to estimate PM emission impacts from the "Ash Silo Unloading" should be reevaluated. The analysis attributed 22 per cent of the IGS 24-hour average impact for PM to "Ash Silo Unloading." The 22 per cent contribution would seem too high since the IGS fly ash will be mixed with scrubber sludge to create a mixture which is 25 per cent moisture.*

Response: The fly ash silo unloading emission rate was based on procedures previously accepted by EPA Region VIII. However, after reviewing current literature, we agree that this estimate should change.

*Comment 6: The Department requests that ash silo vent emission impacts be included in the analysis.*

Response: Emissions from the ash silo vents are included in Tables 1 and 2 and will be included in the revised analysis. Emissions from other fabric filters are included with the appropriate handling operations.

*Comment 7: The Department requests B&V to analyze the amount of additional acreage required at the north-northeast boundary to prevent violation of the PSD increment standards and NAAQS.*

Response: Location where increment standards are violated, if any, will be noted.

*Comment 8: The design coal, Coal B, should be used for the "average case" and for the "worst case;" a blend of 50 per cent Coal B and 50 per cent Coal F should be used, since these were the coals used in the boiler design.*

Response: B&V's opinion is that annual and short-term impacts should be based on average and worst case conditions, respectively. Therefore, the weighted average coal should be used when predicting the annual impact and the worst coal should be used for the 24-hour impact. Of all the proposed coals and combinations of coals presented in the steam generator specification, Coal A exhibits properties which would result in the worst case condition. Coal A has a low heating value and a high ash content resulting in a higher fuel consumption rate and generation of more fly ash. However, recently revised coal data may indicate that another coal is now worse than Coal A.

The earlier version of this study followed precident by deriving a worst case coal from weighted average coal data by decreasing heating value 15 per cent and increasing ash content 15 per cent. As discussed in the previous paragraph, it is planned to use measured rather than derived worst case coal data for the revised study.

*Comment 9: The analysis estimated a 90 per cent control efficiency for PM for the reserve coal storage pile. The control efficiency seems low since the pile will be covered with a sealing agent. The Department requests that B&V clarify this issue.*

Response: In regard to the control efficiency assumed for the reserve coal pile, the literature states that crusting agents can be up to 99 per cent effective. A 90 per cent efficiency is commonly used to estimate emissions. A higher control efficiency may be appropriate since emissions from inactive storage tend to decrease with time as fines are disbursed. As noted on Table 1, use of a 95 per cent control efficiency is suggested.

*Comment 10: The analysis states the IGS will handle three unit trains per day and 10 million tons of coal per year. The correct values are 2.9 coal trains per day and 8 million tons of coal per year.*

Response: Based on coal characteristics presented in the steam generator specification, the quantity of coal received annually and daily will be on the order of 8 million tons and 27,500 tons (three 84-car trains and fifty-eight 40-ton trucks). The quantity of coal delivered daily by trucks was calculated by dividing the expected annual truck delivered quantity (10 per cent of the total) by 350 days of delivery. The quantity consumed annually and during the worst case day will be 8 million tons and 39,000 tons, repsectively. The worst case daily amount is based on all four units operating at MCR conditions and burning Coal A. If compliance with the Prevention of Significant Deterioration (PSD) increments can be shown with this situation, all possible situations should be within the PSD increments.

Annual limestone consumption and delivery, based on the current load model, will be 184,000 tons. The worst case daily limestone consumption rate will be 1,250 tons, based on scrubber requirements for Coal A. The maximum delivery rate will be 1,400 tons (fifty-eight 24-ton trucks). These limestone amounts will be used in the revised analysis.

*Comment 11: The Department requests that B&V provide all PM air quality impact concentrations. The 24-hour average air quality fugitive emission impacts for PM by modeling modified coal and the reserve coal storage pile at 2,153,000 tons are not given in the analysis.*

Response: All predicted particulate impacts including those based on the coal reserve pile at 2,153,000 tons will be compared within the revised analysis with the appropriate increments and standards.

*Comment 12:* *On Page A-4 (Appendix), Part A, Reserve Coal Storage, there is a mathematical error. The last mathematical operation in Part A should equal 0.00001 g/sec/$m^2$, not 0.0001 g/sec/$m^2$.*

Response: Although there was a typographical error in the Appendix, the correct value (0.00001 g/sec/$m^2$) was used in the dispersion modeling.

*Comment 13:* *The June 1981 H. E. Cramer Company, Inc., "Calculated Air Quality Impact of Emissions From the IPP Power Plant for the Revised Stack Configuration" dicussses that uncontaminated wind-blown soil background concentrations need not be considered in assessing compliance with the NAAQS. The Department requests B&V to include a discussion on this subject in the analysis.*

Response: A discussion which addresses the high particulate background concentration will also be included in the revised analysis as part of the comparison with the air quality standards.

It is anticipated that a revised draft of the Fugitive Dust Emissions study can be developed in six to eight weeks after we receive coal data and any further comments you wish to offer.

If you have any questions concerning the above items, please contact Don Wilson (816-967-2717).

Very truly yours,

BLACK & VEATCH

P. F. Bannister

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Enclosure

cc: Ms. Charlotte J. Welty
Mr. Tim L. Conkin

TABLE 1. PROPOSED FUGITIVE DUST SOURCES AND CONTROLLED EMISSION RATES FOR THE 24-HOUR IMPACT ANALYSIS

| Potential Fugitive Dust Sources | Uncontrolled Emission Factor | Control Efficiency | Controlled Emission Factor | Basis for Emissions |
|---|---|---|---|---|
| Reserve Coal Pile | | | | |
| Stockout | -- | -- | -- | 0* |
| Reclaim | -- | -- | -- | 0* |
| Wind Erosion | 4.2 $\frac{lb/h}{acre}$ | 95 | 0.21 $\frac{lb/h}{acre}$ | 2,153,000 tons (35.3 acres) |
| Short-term Coal Pile | | | | |
| Stockout | -- | -- | -- | 0* |
| Reclaim | -- | -- | -- | 0* |
| Wind Erosion | 4.2 $\frac{lb/h}{acre}$ | 90 | 0.42 $\frac{lb/h}{acre}$ | 331,000 tons (7.6 acres) |
| Active Coal Pile | | | | |
| Stockout | -- | -- | -- | 0* |
| Reclaim | -- | -- | -- | 0* |
| Wind Erosion | 4.2 $\frac{lb/h}{acre}$ | 90 | 0.42 $\frac{lb/h}{acre}$ | 60,000 tons (1.4 acres) |

*Not expected to occur during the assumed 24-hour period.

TABLE 1 (Continued). PROPOSED FUGITIVE DUST SOURCES AND CONTROLLED EMISSION RATES FOR THE 24-HOUR IMPACT ANALYSIS

| Potential Fugitive Dust Sources | Uncontrolled Emission Factor | Control Efficiency | Controlled Emission Factor | Basis for Emissions |
|---|---|---|---|---|
| Coal Barn | | | | |
| Stockout | 0.017 lb/ton | 99.8 | 0.00003 lb/ton | 18,500 tons/day* |
| Reclaim | 0.008 lb/ton | 100 | 0 | 30,000 tons/day |
| Wind Erosion | Negligible | -- | -- | 60,000 tons |
| Reserve Coal Stockout Pile | -- | -- | -- | 0** |
| Emergency Coal Stockout Pile | -- | -- | -- | 0** |
| Coal Unloading | | | | |
| Railcar | 0.0058 lb/ton | 99.8 | 0.00001 lb/ton | 25,200 tons/day |
| Truck | 0.0026 lb/ton | -- | 0.0026 lb/ton | 2,300 tons/day |
| Haul Road (coal trucks) | 4.5 lb/vehicle mile | 75 | 1.12 lb/vehicle mile | 58 round trips/day (3.0 miles each) |
| Coal Crushing | -- | 99+ | Outlet 0.02 grains/cu ft | 31,900 cu ft/min |
| Coal Conveying | 0.02 lb/ton | 90 | 0.002 lb/ton | 39,000 tons/day |
| Coal Transfer | 0.10 lb/ton*** | 99 | 0.001 lb/ton*** | 39,000 tons/day |

*9,000 tons sent directly to units.

**Not expected to occur during the assumed 24-hour period.

***Total emission factor for all transfer points.

TABLE 1 (Continued). PROPOSED FUGITIVE DUST SOURCES AND CONTROLLED EMISSION RATES FOR THE 24-HOUR IMPACT ANALYSIS

| Potential Fugitive Dust Sources | Uncontrolled Emission Factor | Control Efficiency | Controlled Emission Factor | Basis for Emissions |
|---|---|---|---|---|
| Reserve Limestone Pile | | | | |
| Stockout | -- | -- | -- | 0* |
| Reclaim | -- | -- | -- | 0* |
| Wind Erosion | $2.1 \frac{lb/h}{acre}$ | 95 | $0.105 \frac{lb/h}{acre}$ | 90,000 tons (2.4 acres) |
| Active Limestone Pile | | | | |
| Stockout | 0.011 lb/ton | 75 | 0.0028 lb/ton | 1,400 tons/day |
| Reclaim | 0.005 lb/ton | 90 | 0.0005 lb/ton | 1,250 tons/day |
| Wind Erosion | $2.1 \frac{lb/h}{acre}$ | 90 | $0.21 \frac{lb/h}{acre}$ | 2,000 tons (0.1 acres) |
| Limestone Unloading | | | | |
| Railcar | -- | -- | -- | 0* |
| Truck | 0.007 lb/ton | -- | 0.007 lb/ton | 1,400 tons/day |
| Haul Road (limestone trucks) | 4.5 lb/vehicle mile | 75 | 1.12 lb/vehicle mile | 58 round trips/day (3.0 miles each) |
| Limestone Crushing/Transfer | 0.05 lb/ton | 99.8 | 0.0001 lb/ton | 1,250 tons/day |

*Not expected to occur during the assumed 24-hour period.

TABLE 1 (Continued). PROPOSED FUGITIVE DUST SOURCES AND CONTROLLED EMISSION RATES FOR THE 24-HOUR IMPACT ANALYSIS

| Potential Fugitive Dust Sources | Uncontrolled Emission Factor | Control Efficiency | Controlled Emission Factor | Basis for Emissions |
|---|---|---|---|---|
| Limestone Conveying | 0.01 lb/ton | 90 | 0.001 lb/ton | 1,250 tons/day |
| Fly Ash Silo Vents | -- | 99+ | Outlet 0.09 grains/cu ft | 18,000 cu ft/min |
| Fly Ash Silo Unloading | -- | 99+ | 0.0014 lb/ton | 6,660 tons/day |
| Haul Road (solid waste trucks) | 4.5 lb/vehicle mile | 75 | 1.12 lb/vehicle mile | 155 round trips/day (4.6 miles each) |
| Waste Disposal Area | Negligible | -- | -- | 20 acres active |

TABLE 2. THE PROPOSED 24-HOUR EMISSION FACTOR EQUATIONS AND ASSUMED INPUT PARAMETERS

| Source | Emission Factor Equation | Assumed Parameters | Emission Factor* |
|---|---|---|---|
| Coal Pile Wind Erosion $\frac{(\text{lb/year})}{\text{acre}}$ | $\frac{3{,}400\ (e/50)(s/15)(f/25)}{(0.02\ PE)^2}$ | e = 47 tons/acre/year<br>s = 7.7 per cent<br>f = 100 per cent<br>PE = 21 | $4.2\ \frac{\text{lb/h}}{\text{acre}}$ |
| Coal Stockout (kg/t)** | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 7.7 per cent<br>u = 13 m/sec<br>H = 3 m<br>M = 2.8 per cent<br>Y = 4.6 $m^3$ | 0.017 lb/ton<br>(0.008 kg/t)** |
| Coal Unloading (railcar) (kg/t)** | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 7.7 per cent<br>u = 13 m/sec<br>H = 3 m<br>M = 2.8 per cent<br>Y = 110 $m^3$ | 0.0058 lb/ton<br>(0.0029 kg/t)** |
| Coal Unloading (truck) | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M^2)(Y/4.6)^{1/3}}$ | s = 7.7 per cent<br>u = 13 m/sec<br>H = 1 m<br>M = 2.8 per cent<br>Y = 45 $m^3$ | 0.0026 lb/ton<br>(0.0013 kg/t)** |
| Coal Crushing (grain/cu ft) | -- | -- | Outlet loading of Baghouse<br>0.02 grain/cu ft*** |
| Coal Conveying (lb/ton) | -- | -- | 0.02 lb/ton |

*Uncontrolled emission factor unless noted.

**Kilogram per metric ton.

***Controlled emission factor.

TABLE 2 (Continued). THE PROPOSED 24-HOUR EMISSION FACTOR EQUATIONS AND ASSUMED INPUT PARAMETERS

| Source | Emission Factor Equation | Assumed Parameters | Emission Factor* |
|---|---|---|---|
| Coal Transfer (lb/ton) | -- | -- | 0.10 lb/ton |
| Limestone Stockout (kg/t)** | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 0.4 per cent<br>u = 13 m/sec<br>H = 3 m<br>M = 0.8 per cent<br>Y = 4.6 $m^3$ | 0.011 lb/ton<br>(0.005 kg/t)** |
| Limestone Reclaim (kg/t)** | $\frac{0.0009\ (s/5)(u/2.2)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 0.4 per cent<br>u = 13 m/sec<br>M = 0.8 per cent<br>Y = 4.6 $m^3$ | 0.005 lb/ton<br>(0.0027 kg/t)** |
| Limestone Unloading (truck) (kg/t)** | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 0.4 per cent<br>u = 13 m/sec<br>H = 3 m<br>M = 0.8 per cent<br>Y = 16 $m^3$ | 0.007 lb/ton<br>(0.0035 kg/t)** |
| Limestone Pile Wind Erosion | -- | Assumed to be half the corresponding coal factor | 2.1 $\frac{lb/h}{acre}$ |
| Limestone Crushing/Transfer | -- | Assumed to be half the corresponding coal factor | 0.05 lb/ton |

*Uncontrolled emission factor unless noted.

**Kilogram per metric ton.

TABLE 2 (Continued). THE PROPOSED 24-HOUR EMISSION FACTOR EQUATIONS AND ASSUMED INPUT PARAMETERS

| Source | Emission Factor Equation | Assumed Parameters | Emission Factor* |
|---|---|---|---|
| Limestone Conveying | -- | Assumed to be half the corresponding coal factor | 0.01 lb/ton |
| Fly Ash Silo Vent | -- | -- | Outlet loading of Baghouse 0.02 grain/cu ft** |
| Fly Ash Silo Unloading (kg/t)*** | $\frac{0.0009\ (s/5)(u/2.2)(H/1.5)}{(0.5\ M)^2\ (Y/4.6)^{1/3}}$ | s = 100 per cent<br>u = 13 per cent<br>H = 1.5 m<br>M = 25 per cent<br>Y = 4.6 $m^3$ | 0.0014 lb/ton**<br>(0.0007 kg/t)*** |
| Haul Roads (lb/vehicle km) | 0.23(s)(S/48)(d/365)(F) | s = 7.3 per cent<br>S = 32 km/h (20 mph)<br>d = 275 days with less than 0.01 inch precipitation<br>F = 1.5 | 4.5 lb/vehicle mile<br>(1.265 lb/vehicle km) |

*Uncontrolled emission factor unless noted.

**Controlled emission factor.

***Kilogram per metric ton.

TABLE 2 (Continued). THE PROPOSED 24-HOUR EMISSION FACTOR EQUATIONS AND ASSUMED INPUT PARAMETERS

Legend:

| | |
|---|---|
| A | Surface area (acres). |
| d | Annual mean number of days in which precipitation was below 0.01 inches. |
| e | Erodibility (tons/acre/year). |
| f | Percentage of time during a year in which wind speed exceeds miles per hour. |
| F | Enhancement factor (2.5 for coal mines). |
| H | Height of release of material. |
| M | Moisture content (percentage of unbound surface moisture). |
| PE | Thornthwaite's precipitation-evaporation index. |
| s | Silt content (percentage of particles less than 75 microns in diameter). |
| S | Average vehicle speed. |
| u | Mean wind speed. |
| Y | Average volume of batch material transferred (usually dump device capacity). |